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ABSTRACT

A booklet is presented which highlights several crucial aspects of educational assessment in general and the ACT Assessment Program in particular. Contents include: (1) Some Uses of Standardized Information, (2) The ACT Assessment Program, (3) Reliability and Validity of the ACT Assessment, and (4) Fairness in Uses of Educational Assessment. (CK)

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HIGHLIGHTS OF THE ACT TECHNICAL REPORT

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THE AMERICAN COLLEGE TESTING PROGRAM

HIGHLIGHTS OF THE ACT TECHNICAL REPORT

The American College Testing Program (ACT) is dedicated to the enrichment of education. It was founded as a public trust and operates as a nonprofit corporation governed by elected educational representatives from individual states or regions, and by a Board of Trustees.

A fundamental goal of ACT is to exercise educational leadership through guidance-oriented assessment and research services in order to (1) assist in the identification and solution of educational problems and (2) communicate to the general and professional publics knowledge and ideas about education.

The chief beneficiaries of ACT's services are students, secondary schools, institutions of postsecondary education, and educational researchers.

Prepared by the Research and Development Division
The American College Testing Program

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ACT Publications, P.O. Box 168, Iowa City, Iowa 52240

(Can also be ordered as part of a boxed set containing in addition Volumes One and Two of *Assessing Students on the Way to College.* Volume One is *Technical Report for the ACT Assessment* and Volume Two is *College Student Profiles: Norms for the ACT Assessment.* Price of the complete boxed set is $6. Check or money order must accompany request.)

WHY USE EDUCATIONAL ASSESSMENT?

WHAT IS THE PURPOSE OF ASSESSMENT?

WHAT EXACTLY DO TEST SCORES SHOW?

In attempting to answer these very basic questions, this booklet highlights several crucial aspects of educational assessment in general and the ACT Assessment Program in particular.

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HIGHLIGHTS OF THE ACT TECHNICAL REPORT

Introduction

The American College Testing Program is an independent and nonprofit national educational organization. A primary function of the organization is the transmission of information to students, high schools, and colleges during the students' transition from high school to college. This is accomplished largely through the ACT Assessment Program and its central instrument, the ACT Assessment, which includes a Student Profile Section plus a battery of four tests of educational development: English Usage, Mathematics Usage, Social Studies Reading, and Natural Sciences Reading. The ACT Assessment Program is used each year by approximately one million students and over 20,000 educational institutions.

Many different uses of the ACT Assessment Program are discussed and evaluated in depth in *Assessing Students on the Way to College: Technical Report for the ACT Assessment Program.*[1] That volume includes considerable empirical research about the effectiveness of the parts of the ACT Assessment for various educational uses. This booklet, which is composed of highlights from that larger volume, includes brief information on (1) the uses of standardized information, (2) the description of the ACT Assessment Program, (3) reliability and validity of information collected through the ACT Assessment, and (4) the fairness of uses of ACT as well as other educational assessment information.

Some Uses of Standardized Information

A broad range of information is collected through administration of the ACT Assessment for use as students cross the bridge from secondary school into the expanding and increasingly complex field of higher education. Among the most important areas within that broad range of information is the assessment of general educational development which is reported on a nationally standardized basis. Because measurement of academic achievement yields data for making many important educational decisions,

[1] Volume One of a 2-volume set entitled *Assessing Students on the Way to College.* The 2-volume set may be purchased for $6.00 by writing to ACT Publications, P.O. Box 168, Iowa City, Iowa 52240.

several common uses of such data are surveyed.

Status Report on Student Educational Development

Education in the areas of English, mathematics, social studies, and natural sciences is one of the central functions of high schools and colleges. Thus, at the transition from high school to college it is reasonable to take stock of student educational progress in these important areas. What students have learned in these academic areas is important to them, their parents, their high schools, and the colleges which they wish to attend. Because the ACT Assessment provides information on student educational development in these four important subject matter fields of high school instruction, it supplies a highly relevant status report of student school achievement.

Common Information on Educational Status

Suppose Marsha Edwards attended a high school with an excellent academic program but ranked only near the middle of her high school class. On the other hand, suppose Jonathan Marshall attended a high school with an unimpressive program and ranked near the top of his class. Both Marsha and Jonathan applied to State University which has a rather rigorous academic program. Several questions might be of concern to Marsha and Jonathan and to State University. Does the excellence of Marsha's high school program indicate that she has had adequate preparation for State University's program and the poorer high school program experienced by Jonathan indicate that he is inadequately prepared? Or does Jonathan's high standing in his class indicate adequacy and Marsha's moderate standing inadequacy? Faced with these types of questions, students and colleges need information that is the same for all students. It is this kind of important uniform information which the ACT Assessment provides. Given their test scores, Marsha may show that she is prepared for State University in spite of her rank in class and Jonathan may give evidence of his satisfactory preparation even though he attended a poor high school. In both cases, the test scores provide important uniform information to supplement the high school record for educational decisions by students and colleges.

Educational Information for Student Placement

Not all college freshmen are ready to begin college instruction at the same level in all instructional domains. One may have a mathematics background sufficient to begin college instruction in calculus. Another may have had poorer high school mathematics courses and therefore need college algebra. Yet a third may enter a field of study requiring mathematics at

a level which he/she has already achieved in high school. The placement of students in appropriate college coursework is a complex task made difficult by the variance in quality and scope of high school instruction. Information about educational development from the ACT Assessment again can assist students and colleges in making these important placement decisions.

Base Line Data on Students for Institutional Research

Colleges are continually confronted with questions about the characteristics of their student body from their faculty, governing boards, and state and federal governments. They are asked to describe how their entering students differ from students in previous years, how they change while in college, and how much they are learning. The answers to these and similar questions require comparable entry data for all students. The variety of information collected through the ACT Assessment satisfies this need for base line data for many institutional research questions.

Prediction of Academic Performance

Informal predictions are made daily. For example, a person looks out the window to decide if it is likely to rain. Using some predictor variables (e.g., the appearance of the clouds, the feeling in his bones), the person makes a prediction. Given a prediction of rain, at least three types of decisions can be made in an attempt to avoid getting wet: (1) to stay home, thus completely avoiding the possibility of getting wet; (2) to go out, but carry an umbrella; or (3) to ignore the prediction and go out without an umbrella. Note that a person's prediction of rain will be useful only if similar predictions have frequently been correct in the past, that is, if the predictor variables are actually related to the outcome, rain. Most people's prediction of rain is at least good enough that they will rarely ignore the possibility of rain if they see dark threatening clouds.

Predictions in education operate in a similar fashion. While dark threatening clouds may be predictive of rain, in education high school grades and scores on standardized tests of educational development are known to be among the best predictors of college academic success. When these predictors suggest the possibility of poor academic performance at a college, several courses of action are open to the college with obvious parallel options for the student. First, the college may protect both the student and itself from the consequences of possible failure by not admitting him/her (completely avoiding the possibility of getting wet). Colleges with limited enrollment and curricula at a specific educational level are those most likely to be involved in this type of decision. Other colleges with more flexible enrollment policies and curricula may make the second decision: to admit the student but provide some assis-

tance in an effort to avoid failure (to carry an umbrella). For example, judgments can be made about an appropriate course of study, where to begin in that course of study, and how much assistance will be needed to assure success. However, just as it makes little sense to ignore the gathering storm clouds, few colleges see any benefits either to themselves or to their students in ignoring predictions of probable performance.

There are several characteristics of the predictions related both to the weather and to educational performance which should be noted. First, predictions are only statements of likely events; they do not predetermine either the weather or academic performance. Second, predictions are useful only if they are based on valid predictors. A person's "feeling in his bones," which may or may not be related to the weather, is useful as a predictor only if it is related to impending weather conditions. Formal validation of predictors is the best way to determine their usefulness. Third, formal statistical prediction procedures have advantages over informal ones. A statistical prediction procedure focuses directly on the outcome of interest and automatically weights the more helpful predictors more heavily, and at the same time discards the useless ones. Finally, to ignore valid predictions of the weather or of educational outcomes is to ignore information which can be used to help assure more desirable outcomes. Properly used, predictions can make a positive contribution to the enterprise of educating youngsters.

The ACT Assessment Program

The ACT Assessment Program is divided into two major parts:

- Information gathering and reporting services based on the ACT Assessment
- Descriptive and predictive analyses provided through the ACT Research Services

The content of these two parts of the program is described in this section.

The ACT Assessment

The ACT Assessment is an examination-questionnaire by which student information is collected. Because such information is used by students, high schools, and colleges to assist in making a variety of decisions, several types of student information are collected through the four tests of educational development, the self-reported high school grades, and the Student

Profile Section of the ACT Assessment. The information collected is analyzed and reported to students, high schools, and colleges for their various uses.

The ACT Assessment derives its meaning not only through statistical relationships with other important variables but also through the educational importance of its content. Knowledge of the content of any assessment is important for appropriate interpretation in the many unique situations in which assessment is used. In the case of the ACT Assessment, the obvious educational meaning of the content especially contributes to its appropriate use by educators. Because it is important that the content of the ACT Assessment be known to users and that it be educationally meaningful, the next sections describe that content in some detail.

The four tests of the ACT Assessment. The measurement of developed academic abilities has traditionally been an important part of assessment at the high school-to-college transition. In the ACT Assessment, developed academic abilities are assessed in four areas of high school and college curricula: English, mathematics, social studies, and natural sciences. The fundamental idea behind the development of the tests is that the best way to predict success in college is to measure as directly as possible the abilities required in college work. This means that the tasks on the tests must be representative of important scholastic skills. They must be intricate in structure, comprehensive in scope, and representative of educationally significant abilities.

The ACT English Usage Test is a 75-item, 40-minute test which measures students' understanding and use of the basic elements in correct and effective writing: usage, phraseology, style, and organization. The test gives considerably greater weight to clear and effective expression and analysis of forms of expression than to rote recall of rules of grammar. In fact, grammatical rules in a state of transition are carefully avoided. The test consists of several prose passages with certain portions underlined and numbered. For each underlined portion, four alternative responses are given. The student must decide which response is most correct or appropriate. In Table 1, the major content areas are described and a limited sample of the content is illustrated.

The ACT Mathematics Usage Test is a 40-item, 50-minute examination which measures a student's mathematical reasoning ability. The solution of quantitative reasoning problems encountered in many college curricula is emphasized. Although a sampling of the mathematical techniques covered in high school courses is included, the test emphasizes reasoning rather than memorization of formulas, knowledge of techniques, or computational skills. In Table 2 the five types of content are outlined and examples illustrate the format of the test in which questions are followed by five alternative responses.

The ACT Social Studies Reading Test is a 52-item, 35-minute test that

TABLE 1

Content of the ACT English Usage Test

Grammar and punctuation. Punctuation and graphic conventions; usage in agreement; verb forms; use of adjectives, adverbs, and nouns; pronouns and their antecedents. (Proportion of test = .35)

Sentence structure. Relation clauses; parallelism; placement of modifiers; and predication and shifted constructions. (Proportion of test = .25)

Diction. Word choice and idioms; figurative language; and economical writing. (Proportion of test = .35)

Logic and organization. Logical organization of ideas; the elimination of inappropriate ideas and statements; proper wording of transitions; paragraphing; and appropriate conclusions. (Proportion of test = .05)

Sample questions

Although sixty-five years ago, the open range has all but disappeared, cowboys still herd cattle in the West, still ride horses. And roundups are still held. And ranches, though fenced, still spread over ranges which were almost as extensive as the holdings of Goodnight and Littlefield and Iliff nearly three-quarters of a century ago. A decade ago there remained near to 1000 ranches of more than 20,000 acres per each ranch; more than one-fourth of these—most of them in Texas, New Mexico, and Arizona—containing more than 100,000 acres.

1 A. NO CHANGE
B. ago, the open range was practically
C. ago the open range is all intents and purposes
D. ago the open range had almost

2 F. NO CHANGE
G. horses. They still hold roundups.
H. horses, roundups are still held.
J. horses, and still hold roundups.

3 A. NO CHANGE
B. fenced still will spread
C. fenced still are spreading
D. fenced, still have spread

4 F. NO CHANGE
G. ranges being
H. ranges, making them
J. ranges

5 A. NO CHANGE
B. nearly a thousand
C. something like 1000
D. in the neighborhood of a thousand

6 F. NO CHANGE
G. in each;
H. each;
J. at each one;

7 A. NO CHANGE
B. and containing
C. contained
D. contain

English Usage Answer Key

1. D	4. J	7. C
2. J	5. B	6. H
3. A		

TABLE 2

Content of the ACT Mathematics Usage Test

Arithmetic and algebraic reasoning. Word problems about practical situations requiring algebraic and/or arithmetical reasoning in which the student must interpret the question and find an approach to its solution. (Proportion of test = .35)

Arithmetic and algebraic operations. Explicitly described operations to be completed such as manipulation of fractions, decimals, signed numbers, and polynomials. (Proportion of test = .15)

Advanced algebra. Dependence and variation of quantities related by formulas; arithmetical and geometric series; solution of simultaneous equations; inequalities; roots of equations; factoring polynomials; etc. (Proportion of test = .20)

Geometry. Mensuration of lines and plane surface; properties of polygons and circles; loci; Pythagorean theorem; etc. (Proportion of test = .20)

Miscellaneous. Set theory; probability; logic; properties of numbers; and bases of number systems. (Proportion of test = .10)

Sample questions

1. Two wells pump oil continuously. One produces 4000 barrels of oil per day, which is 33 1/3 percent more than the other well produces. How many barrels of oil are produced daily by the two wells?
   A. 5333 1/3
   B. 6666 2/3
   C. 7000
   D. 8333 1/3
   E. 9000

2. If a car travels a miles in b minutes, how many minutes will it take to travel c miles?
   F. cb/a
   G. c/a
   H. ab/c
   J. c/b
   K. c/ab

3. A boy bought three pencils at 5 cents each, a 10-cent eraser, and a 15-cent bottle of ink. If he gave the clerk a dollar bill, how much change should he receive?
   A. 25¢
   B. 30¢
   C. 40¢
   D. 50¢
   E. None of these

4. What is the product of $2a$ and $(b + c)$?
   F. $2ab + 2ac$
   G. $2ab + c$
   H. $2abc$
   J. $2b + ac$
   K. None of these

5. A rectangle is five times as long as it is wide. The perimeter of the rectangle is 72 feet. How many feet wide is the rectangle?
   A. 6
   B. 10
   C. 12
   D. 18
   E. None of these

6. Sides AB and AC of triangle ABC are equal. If angle B is 70 degrees, how many degrees are there in angle A?
   F. 40
   G. 50
   H. 60
   J. 70
   K. 110

7. What values of x and y satisfy the following simultaneous equations?
   $3y = x + 4$
   $6x + 2y = 16$
   A. $x = -2; y = 2$
   B. $x = 2; y = -2$
   C. $x = -2; y = -2$
   D. $x = 2; y = 2$
   E. None of these

Mathematics Answer Key

1. C	4. F	7. D
2. F	5. A	
3. E		

measures evaluative reasoning, reading, and problem-solving skills required in social studies. There are two general types of items: the first type is based on reading passages, the second on general background information obtained primarily in high school social studies courses. All items are multiple choice with four alternatives. The items based on the reading passages require more than reading comprehension skills. They require the student to draw inferences and reach conclusions; to extend the thoughts in the passage to a new situation; to make deductions from experimental or graphic data; and to recognize a writer's bias, style, and mode of reasoning. The content areas and sample questions are given in Table 3.

The ACT Natural Sciences Reading Test is a 52-item, 35-minute test that measures the critical reasoning and problem solving skills required in the natural sciences. There are two types of items: the first based on reading passages, the second on information about science. All items are multiple choice with four alternatives. The passages concern a variety of scientific topics and problems, with summaries of procedures and outcomes of experiments among the most common. The items require a student to interpret and evaluate scientific materials, and in particular to understand the purposes of experiments, the logical relations between experimental hypotheses, and generalizations which can be drawn from the experiments. The content areas in the test are outlined in Table 4, where sample items are also given.

Four student-reported high school grades. As a part of the ACT Assessment, students are asked to report the latest grade in English, mathematics, social studies, and natural sciences obtained prior to the senior year. These student-reported grades are known to be excellent estimates of high school academic achievement and are a valuable supplement to tested achievement for descriptive and predictive purposes.

The Student Profile Section. The Student Profile Section complements the academic sections of the ACT Assessment by providing students the opportunity to express their particular aspirations, needs, talents, and backgrounds. The Student Profile Section is included in the ACT Assessment on the assumption that the quality of plans and decisions is affected by the breadth of information available and that more than academic information is needed.

The content of the Student Profile Section is outlined in Table 5. Basic biographical information includes name, sex, birth date, size of high school class, family income, and racial-ethnic background.[2] The student's educational and vocational plans include choice of program of study, degree goal, planned extracurricular activities, and planned future vocation. Using such items as, "I have performed with a professional music

[2]Questions on family income and racial-ethnic identification are both optional and students not wishing to divulge this information may choose the response, "I do not wish to respond."

TABLE 3

Content of the ACT Social Studies Reading Test

The ACT Social Studies Reading Test contains both inference items based on reading passages and information items on background knowledge in three major areas of social studies in the proportions specified below.

Proportional Distribution of Items

	Inference Items	Information Items	Total
European and Ancient History	.14	.06	.20
Government and American History	.28	.12	.40
Current Social Issues, Sociology, Economics, etc.	.28	.12	.40
Total	.70	.30	1.00

Sample Inference Items

Certain similarities between the civilizations of ancient Peruvian Indians and the civilizations of the inhabitants of some Pacific islands led Thor Heyerdahl to believe that possibly in the past the Peruvians had migrated across the Pacific and established homes on the islands. Peruvian Indian relics depicting large rafts of balsa wood indicate the manner in which this migration might have taken place. In order to see whether the journey was possible in such a vessel, Heyerdahl had a raft constructed of balsa logs and rope, reproducing as nearly as possible the original construction used by the Indians. The raft was equipped with a generous supply of canned and fresh food and water. A short-wave radio was also included. With a crew of six men, the raft set out from Peru in April 1947, and began to drift away in the Humboldt Current. The raft was wrecked on an uninhabited island far out in the Pacific 101 days later, and the crew made their way to shore safely. A week later they were found by Polynesians who arrived in canoes from a nearby island.

1. The raft was constructed of balsa logs and rope because
   - A. Peru is an underdeveloped country with few resources
   - B. it was necessary to show that Indians could have made the trip
   - C. the native workers were not familiar with advanced designs
   - D. more rugged materials were not available at the time

2. What effect did the carrying of a short-wave radio have on the validity of the experiment?
   - F. It tended to increase the validity, because the added weight made the trip more hazardous.
   - G. It tended to invalidate the experiment, because it made the crew feel safer.
   - H. It tended to invalidate the experiment, because the ancient Indians could not have had radios.
   - J. It had no effect on the validity of the experiment.

Sample Information Item

3. The main purpose of the Bill of Rights is to
   - A. prevent presidents from telling states what to do
   - B. enlarge the scope of the powers of the federal government
   - C. lessen the power of the Supreme Court to declare acts of Congress unconstitutional
   - D. limit the power of the federal government to abuse individual freedom

Social Studies Answer Key

1. B	2. J	3. D

TABLE 4

Content of the ACT Natural Sciences Reading Test

The ACT Natural Sciences Reading Test contains both inference items based on reading passages and information items on background knowledge in three major areas of natural sciences in the proportions specified below.

Proportional Distribution of Items

	Inference Items	Information Items	Total
Biology	.36	.12	.48
Chemistry	.17	.06	.23
Physics, Geology, Astronomy and General Science	.17	.12	.29
Total	.70	.30	1.00

Sample Information Item

1. The emergence of new strains of houseflies capable of withstanding the poisonous effects of the chemical DDT is an example of
   A. adaptation
   B. the Mendelian law
   C. implementation
   D. regeneration

Sample Inference Items

When a mosquito feeds on a mammalian host, a wheal commonly develops around the puncture site. In man, wheal formation is usually accompanied by inflammation and irritation. Controlled experiments with rabbits have shown that the reaction to mosquito bites is of a hypersensitive type, and therefore it occurs in response to the injection of an antigen, a substance which stimulates the production of an antibody when injected into the body.

Aedes stimulans (Walker) is a comparatively large species of mosquito. The female of this species was selected for the following experiment in which the main salivary duct leading to the hypopharynx was to be severed.

Before the salivary duct was cut, the mosquito was anesthetized with carbon dioxide and placed on its back on a slide. A thin tungsten needle, sharpened to a fine point, was used to make a small incision in the anterior region of the neck, exposing the salivary duct. This duct was then cut with a sharpened sliver of tungsten wire. The mosquito was then transferred to a vial and supplied with sucrose (sugar) solution. Mortality rates were high, undoubtedly because of handling techniques and also because of the variation in age of the mosquitoes.

After a recovery period of 24 hours, an operated mosquito and an unoperated mosquito were offered a blood meal from the arm of a human subject. This procedure was repeated with a number of pairs of mosquitoes. Many of the surviving operated mosquitoes did not attempt to bite. However, twelve individuals did bite and became fully engorged with blood. The bites of females whose salivary ducts had been cut failed, in every case, to produce a wheal or an irritation. The bites of the other mosquitoes in an adjacent area on the arm produced the usual wheal.

2. The reason for offering a blood meal to unoperated mosquitoes was to
   F. goad the still-groggy operated mosquitoes into feeding
   G. provide experimental controls
   H. make sure that normal mosquitoes could pierce the skin of the human subjects
   J. provide a source of antigen for future experiments

3. The purpose of this experiment was to determine
   A. if a mosquito bite, unaccompanied by salivary secretions, would produce the characteristic symptoms in a human
   B. how many mosquitoes with severed salivary ducts would bite a human
   C. how many mosquitoes would survive for 24 hours after such an operation
   D. whether a bite from a mosquito fed on sugar would produce a wheal or an irritation

Natural Sciences Answer Key

1. A	2. G	3. A

TABLE 5

Content of the ACT Student Profile Section

Biographical Information

Name
Sex
Birth date
Social Security Number
Mailing address
Family income
Racial-ethnic background
Size of high school class
Current educational level
Participation in high school honor courses

Educational-Vocational Plans

Program of study
Planned vocation
Degree goal
Extracurricular plans (music, student government, debate, etc.)
Interest in special advanced programs
Full- or part-time enrollment

Out-of-Class Accomplishments

Athletics
Work experience
Practical skills
Leadership
Music
Art
Writing
Science

Factors Influencing College Choice

Primary advisors (parents, teachers, etc.)
Characteristics of the college (faculty, standards, size, location, etc.)

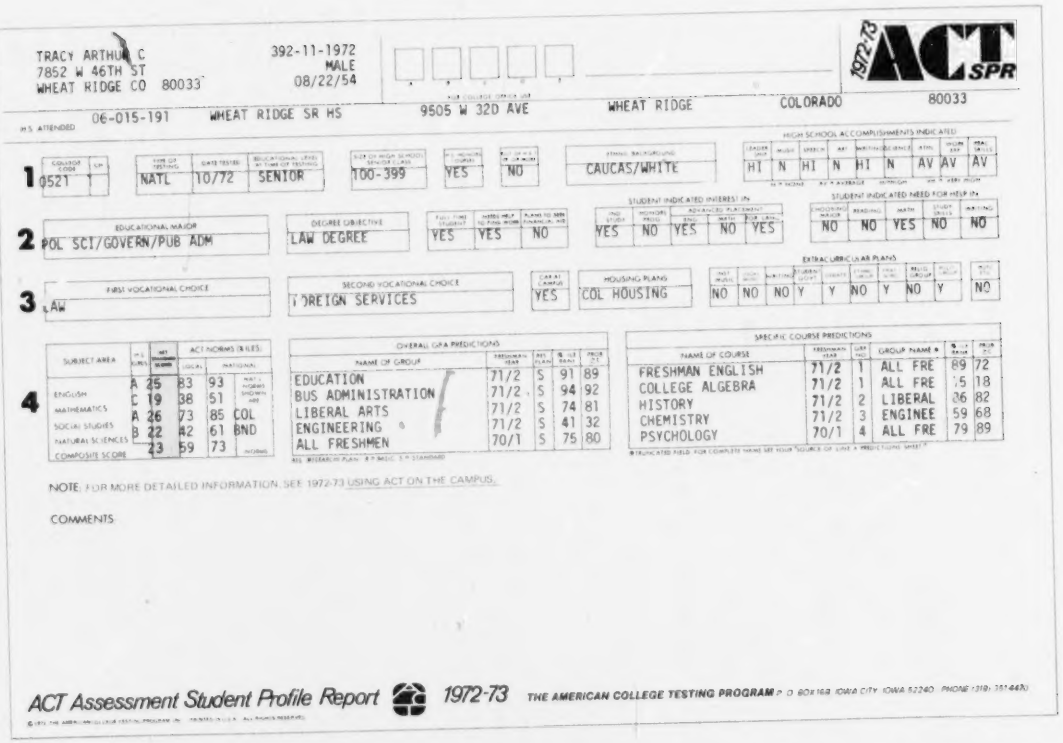
Special Needs

Financial aid
Employment
Educational needs (reading, math, study skills, etc.)

group, composed music, been appointed to a student office, entered a debate contest, had poems or articles published," the out-of-class accomplishment scales identify students with outstanding extracurricular accomplishments in the areas of leadership, music, art, writing, science, athletics, work experience, and practical skills. Since the Student Profile Section elicits a broad spectrum of information, it provides both students and colleges descriptions of students useful for planning and decision making.

ACT reporting services. The broad information collected through the ACT Assessment is organized, scored, and analyzed for reporting in a useful form to students, high schools, and colleges. For purposes of illustration, a sample of the printed report sent to colleges is given in Figure 1.[3] These reports feature the wide variety of information reported, the use of test scores as only one of several important types of information, and the use of the more valid college grade predictions (using test scores and high school grades together) rather than emphasizing either test scores or high school grades by themselves.

[3]Data from the ACT Assessment are also available in magnetic tape or punched card form.



TRACY ARTHUR C
7852 W 46TH ST
WHEAT RIDGE CO 80033

392-11-1972
MALE
08/22/54

1972-73 ACT SPR

H.S. ATTENDED 06-015-191 WHEAT RIDGE SR HS — 9505 W 32D AVE — WHEAT RIDGE — COLORADO — 80033

1

COLLEGE CODE	S/H
0521	

TYPE OF TESTING	DATE TESTED	EDUCATIONAL LEVEL AT TIME OF TESTING
NATL	10/72	SENIOR

SIZE OF HIGH SCHOOL SENIOR CLASS	HONORS PROGRAM	ATTENDED SUMMER SCHOOL
100-399	YES	NO

ETHNIC BACKGROUND: CAUCAS/WHITE

HIGH SCHOOL ACCOMPLISHMENTS INDICATED

LEADERSHIP	MUSIC	SPEECH	ART	MATHEMATICS/SCIENCE	ATHL	HUMAN REL	MECH SKILLS
HI	N	HI	N	HI	N	AV	AV	AV

2

EDUCATIONAL MAJOR	DEGREE OBJECTIVE	FULL-TIME STUDENT	NEED HELP TO FIND WORK	PLANS TO APPLY FOR FINANCIAL AID
POL SCI/GOVERN/PUB ADM	LAW DEGREE	YES	YES	NO

STUDENT INDICATED INTEREST IN

IND STUDY	HONORS PROG	ADVANCED PLACEMENT	WORK EXPER	STUDY ABROAD
YES	NO	YES	NO	YES

STUDENT INDICATED NEED FOR HELP IN

CHOOSING A MAJOR	READING	MATH	STUDY SKILLS	WRITING
NO	NO	YES	NO	NO

3

FIRST VOCATIONAL CHOICE	SECOND VOCATIONAL CHOICE	CAREER CAMPUS	HOUSING PLANS
LAW	FOREIGN SERVICES	YES	COL HOUSING

EXTRACURRICULAR PLANS

ART MUSIC	DRAMA SPEECH	WRITING	STUDENT GOVT	HONORS	PUBLIC AFFAIRS	RELIG GROUP	POLIT GROUP	
NO	NO	NO	Y	Y	NO	Y	NO	Y	NO

4

SUBJECT AREA	H.S. CURR	NET SCORE	ACT NORMS (%ILES): LOCAL	NATIONAL
ENGLISH	A	25	83	93
MATHEMATICS	C	19	38	51
SOCIAL STUDIES	A	26	73	85
NATURAL SCIENCES	B	22	42	61
COMPOSITE SCORE		23	59	73

NATL NORMS UNKNOWN ARE: COL, BND

OVERALL GPA PREDICTIONS

NAME OF GROUP	FRESHMAN YEAR	SEX	% ILE RANK	PROB %
EDUCATION	71/2	S	91	89
BUS ADMINISTRATION	71/2	S	94	92
LIBERAL ARTS	71/2	S	74	81
ENGINEERING	71/2	S	41	32
ALL FRESHMEN	70/1	S	75	80

SPECIFIC COURSE PREDICTIONS

NAME OF COURSE	FRESHMAN YEAR	SEX	GROUP NAME *	% ILE RANK	PROB %
FRESHMAN ENGLISH	71/2	1	ALL FRE	89	72
COLLEGE ALGEBRA	71/2	1	ALL FRE	75	18
HISTORY	71/2	2	LIBERAL	86	82
CHEMISTRY	71/2	3	ENGINEE	59	68
PSYCHOLOGY	70/1	4	ALL FRE	79	89

NOTE: FOR MORE DETAILED INFORMATION, SEE 1972-73 USING ACT ON THE CAMPUS.

COMMENTS

ACT Assessment Student Profile Report 1972-73 THE AMERICAN COLLEGE TESTING PROGRAM P. O. BOX 168, IOWA CITY, IOWA 52240 PHONE (319) 351-4470

Fig. 1. ACT's Student Profile Report for colleges.

Note.—Although the Student Profile Report will undoubtedly change in form in future years, this 1972-73 version illustrates the types and variety of information reported.

The ACT Research Services

The ACT Research Services are a regular part of the ACT Assessment Program and are provided to participating institutions at no cost. Major components of the Research Services are one descriptive service (High School Profile Report) for high schools, and one descriptive (Class Profile Report) and two predictive (Basic Research Service and Standard Research Service) services for institutions of higher education. High schools with 50 or more ACT-tested students receive a 28-page descriptive summary of pertinent ACT data through the ACT High School Profile Report, which was sent to 4,063 high schools in 1971-72. In the same academic year, 1,206 colleges received the ACT Class Profile Report, a similar descriptive summary of ACT data for their entering freshmen. The Basic Research Service Report, a predictive analysis requiring minimal input from colleges, went to 502 colleges in 1971-72. The more extensive predictive service, the Standard Research Service, requires considerable information from colleges about grades in various areas and identification of subgroups. It was used by 271 colleges in 1971-72. These various services are provided in an attempt to make the large amount of ACT information more useful by summarizing and analyzing it for each individual institution using ACT information.

Reliability and Validity of the ACT Assessment

The evaluation of different uses of assessment requires different measures of reliability and validity. However, there are several standard measures of reliability and validity which have become familiar for evaluating assessment instruments. Thus, the familiar measures have been drawn from the more extensive evaluations of uses in *Assessing Students on the Way to College: Technical Report for the ACT Assessment Program* and are summarized here.

Reliability

The term reliability refers to the precision of measurement which an assessment provides. Put another way, reliability concerns the accuracy with which a test measures whatever it measures, or conversely the degree of error in the measurement. Reliability can be thought of as the extent to which students tested on two or more occasions would receive the same score. When the concern is the effect of the internal characteristics of the test itself on score changes, reliability can be estimated from statistical characteristics of the test items. When the concern is changes in student scores over a period of time or across different forms of the test, then reliability is estimated from repeated administration of the test.

Reliability estimates are correlation coefficients and range from .00 to 1.00 where .00 means no reliability and 1.00 means perfect reliability. In practice, reliability figures fall between these extremes. In educational measurement at the high school level, test reliabilities are typically in the .70 to .90 range, although they vary depending on the type of reliability, the type of scale, the length of the scale, and other factors.

Three internal indices of reliability are (1) split-half correlations (the correlation of the score on one-half the items with the score on the other half adjusted for the full length of the test), (2) the Kuder-Richardson Formula 20 (K-R 20, based on item difficulties and total score variation), and (3) the coefficient alpha (a more general version of K-R 20). Stability and parallel-form reliability involve the correlation of scores from two administrations of the test over either a short or long time lapse. When available and appropriate, several of these different indices of reliability will be presented for various portions of the ACT Assessment.

The tests of the ACT Assessment. Internal reliability estimates for the tests of the ACT Assessment are summarized in Table 6. The median split-half reliabilities ranged from .85 to .90 for the four subtests while the median for the ACT Composite was .96. For the K-R 20 reliability estimates, the subtest medians ranged from .84 to .89, while the median for the Composite was .91. Several factors contributed to lower coefficient alpha estimates which ranged from .73 to .77 for the subtests with a median of .85 for the ACT Composite. When the various factors which can artificially raise or lower reliability estimates are balanced, it can be concluded that the internal characteristics of the tests indicate a precision of measurement (or reliability) in the range of .80 to .85 for the four tests and near .90 for the ACT Composite.

The concern with stability of test scores over two administrations of alternate forms introduces considerations of external influences on test scores and the result, as a consequence, is slightly lower estimates of reliability than found through internal analyses. When the time interval between administrations of the two forms of the test was short, the median correlations (or reliability estimates) ranged from .73 to .80 for the four tests while the median correlation for the Composite was .90 as shown in Table 7. These figures were only slightly lower for a much longer interval between the administrations (approximately 2 years). Thus, even accounting for external influences, the tests are fairly precise in ranking individuals. The small increase in test scores from the first to the second administration on short-term retesting probably represented a practice effect. In the two cases of retesting after 2 years of college, the increase probably represented educational growth during this period, especially in social studies and natural sciences.

The results of these alternative approaches for examining the reli-

TABLE 6

Summary of Median Reliability Estimates for the ACT Assessment

	Estimates of Reliability and Standard Error of Measurement					
	Split-half[a]		K-R 20[b]		Coefficient Alpha[b,c]	
	Rel.	S.E.M.[d]	Rel.	S.E.M.[d]	Rel.	S.E.M.[d]
English Usage	.90	1.49	.89	1.74	.77	2.37
Mathematics Usage	.88	2.21	.89	2.14	--	--
Social Studies Reading	.87	2.34	.85	2.56	.77	3.17
Natural Sciences Reading	.85	2.41	.84	2.37	.73	3.16
Composite	.96	1.04	.91	1.44	.85	1.91

[a]Based on 10 forms of the ACT Assessment in use from 1967 to 1971. Each reliability given is the median of 10 reliability estimates based on random samples of approximately 1,000 students each. Data are from Table 5.1 of The American College Testing Program (1973).

[b]Based on 12 forms of the ACT Assessment in use from 1968 to 1972. Each reliability given is the median of 12 reliability estimates based on random samples of from approximately 1,000 to 3,000 each. Data are from Tables 5.2 and 5.3 of The American College Testing Program (1973).

[c]The coefficient alphas were computed by treating the questions associated with each passage on the test as a unit and the information items as a single additional unit. Each test had approximately five units while alpha for the Composite was based on the four tests as units.

[d]The standard errors of measurement (S.E.M.) were based on scaled test scores which range from 1 through 36 with a national mean of approximately 20. Like reliability figures, the S.E.M. is a type of quantification of the amount of error in measurement. If the same individual took a test many times, the scores would not be identical because of error. Instead, the scores would form a distribution around a central score and the standard deviation of that distribution would be the S.E.M. A standard error of measurement of *one* (such as the split-half S.E.M. for the Composite) can be interpreted as follows: two-thirds of an individual's repeated scores would be expected to fall within *one* standard score of his average or central score.

TABLE 7

Summary of Parallel-Form Reliability Estimates for the ACT Assessment

	Less than 6 Months Apart[a]		Two Years Apart[b]	
	Median R[c]	Mean Increase[d]	Median R[c]	Mean Increase[d]
English Usage	.80	.97	.75	.93
Mathematics Usage	.80	.62	.81	.71
Social Studies Reading	.78	.39	.74	2.69
Natural Sciences Reading	.73	.35	.72	1.61
Composite	.90	.58	.87	1.46

[a]Based on five studies in which two parallel forms of the ACT Assessment were administered from 2 weeks to 5 months apart to samples ranging from 433 to 3,089 students. Data from Tables 5.5 and 5.6 of The American College Testing Program (1973).

[b]Based on two studies in which parallel forms of the ACT Assessment were administered before entry to college and at the end of 2 years of college to samples of 63 and 972 students. Data from Table 5.7 of The American College Testing Program (1973).

[c]The correlations are adjusted for the standard deviations of the samples to provide comparable estimates across studies.

[d]The mean increase is the average difference between the second test score and the first for scores on the ACT standard score scale ranging from 1 through 36.

ability of the ACT tests indicate that they are highly reliable for tests of their length. In fact, a combination of the ACT test scores (such as is used in the prediction of college grades) will be even more reliable than the individual test scores. While important in and of itself, precision of measurement is also significant because low precision can restrict the degree of relationship which can be achieved with other variables and hence decrease predictive effectiveness. Therefore, it also should be noted that the reliabilities of the ACT tests are sufficiently high to provide no impediment to the relationship of the tests to other variables of concern.

Student-reported high school grades. Several studies have indicated that students tend to report their grades fairly accurately (e.g., Bligh, 1968; Dunnette, 1952; Munday, 1968; Perry, 1940; and Richards & Lutz, 1968). In a study examining the ACT student-reported grades, Davidsen (1963) found correlations ranging from .91 to .93 between student-reported and school-reported grades in the four subject areas for 10,497 students. In a more recent study, Maxey and Ormsby (1971) compared

ACT student-reported grades with school-reported grades in a sample of 5,775 students at 134 high schools. Correlations of .86, .86, .85, and .81 were found for English, math, social studies, and natural sciences respectively. Grades were reported precisely accurate by 78% of the students on the average while 98% were accurate within one letter grade within subject areas. Grades were overrepresented (16.1%) more than underrepresented (5.9%). Thus, while some discrepancies occur, these studies taken together indicate adequate accuracy in student-reported high school grades for many uses, including college grade prediction.

Out-of-class accomplishment scales. The out-of-class accomplishment scales of the Student Profile Section are designed as indicators of likely college accomplishments based on student reports of activities. Hence the accuracy of the reports must be considered. Maxey and Ormsby (1971) examined 28 of the 63 items most subject to high school confirmation and found agreement between student-reported and school-reported activities ranging from 69% to 99% over the 28 items. The median agreement was 90% indicating considerable accuracy in student reports of activities undertaken. In addition, the reliability (or stability) of the scales (including items not in the above study) over periods of time was examined. Correlations ranged from .81 to .89 over a 1-month interval, from .77 to .89 over a 3-month interval, and from .73 to .84 over a 5-month interval (The American College Testing Program, 1973, Table 5.25). Examinations of the reliability of other parts of the Student Profile Section are included in the same reference. The studies indicate that the out-of-class accomplishment scales and other parts of the Student Profile Section are sufficiently reliable for many important uses, such as institutional planning, counseling students, and identifying students with particular characteristics.

Validity

Users of the ACT data are most commonly concerned with validity of the ACT Assessment as it relates to college activities and accomplishments. Validity of this type is known as predictive validity and will be examined here for several parts of the ACT Assessment.

Tests of the ACT Assessment and high school grades. High school grades and test scores have long been used to predict types of college accomplishment, especially college grades. While we intuitively expect students in high school with high grades and high test scores to be more likely to earn high college grades than students with low test scores and low high school grades, it is important to quantify the degree of the relationship so that both the amount of error in predictions and the validity of tests can be assessed. This quantification is accomplished through a measure of association between test scores and/or high school grades on the one hand and college grades on the other. The measure of association,

called a correlation coefficient, is an index of predictive validity ranging from .00 (no prediction) to 1.00 (perfect prediction). Multiple correlation is the term used when more than one predictor is employed, as when several test scores and high school grades are used together. In practice, predictive validity, like reliability, falls between the zero-one extremes. However, in contrast to reliability estimates, if all the multiple correlation coefficients that have ever been computed between test scores and high school grades vs. college grades could be assembled, most would probably fall between .30 and .60.

In Table 8, the distributions of multiple correlations of the four student-reported high school grades, the four ACT tests, and the grades and test scores combined with first semester college grade point average (GPA) are given for 419 colleges participating in the ACT Standard Research Service in 1968, 1969, or 1970. The results indicate that in most colleges ACT scores and student-reported high school grades are good predictors of overall college GPA with median multiple correlations of .465 and .512 respectively. In addition, the two predictors used in combination (as in the grade predictions provided on the Student Profile Report in Figure 1) result in even better prediction with a median correlation of .576 in the 419 colleges.

Because ACT prediction equations are computed for students one year and applied to different students the following year, it is important to examine how much faith we can have in research done one year and applied to the next year's students. This concern generally falls under the rubric of cross-validation research and means to validate the results across another sample of students to see if the relationships hold. In a cross-validation experiment (The American College Testing Program, 1973), the multiple correlations of ACT scores with college GPA for students in 1970 were compared with the correlations of predicted GPA (using the 1970 prediction equation) with actual GPA of students in 1971 for 50 colleges. The number of students in 1970 on which the equations were constructed varied from 100 (the minimum required by ACT) to more than 1,000. When the number of students was 250 or more there was no average decrease in correlation. Even for the small samples (100-250) the average decrease on cross-validation was only .04. Thus, prediction equations based on ACT scores are sufficiently stable for use from one year to the next and produce cross-validated correlations essentially at the level of the original multiple correlations.

ACT test scores and high school grades are predictive not only of overall college GPA but also of grades in many individual college courses. For many of the 419 colleges on which the data in Table 8 were based, multiple correlations were also available for college English, mathematics, social studies, and natural sciences grades. The median correlations of high school grades, test scores, and the com-

TABLE 8

Distributions of Multiple Correlations of High School Grades and ACT Test Scores with College GPA

Mult. Cor. Interval Midpoint	High School Grades		ACT Test Scores		HS Grades and ACT Scores[a]	
	Freq.	PR	Freq.	PR	Freq.	PR
Above 0.83	--	--	--	--	1	99
0.80	--	--	--	--	2	99
0.77	2	99	--	--	4	99
0.74	3	99	1	99	12	97
0.71	6	98	2	99	21	93
0.68	16	95	3	99	24	88
0.65	20	91	5	98	43	80
0.62	21	86	17	95	50	68
0.59	33	80	20	91	55	56
0.56	55	69	32	85	43	44
0.53	49	57	43	76	43	34
0.50	48	45	52	64	29	25
0.47	35	35	51	52	12	21
0.44	28	28	44	41	24	16
0.41	19	22	39	31	24	11
0.38	21	18	25	23	7	7
0.35	21	13	26	17	12	5
0.32	17	8	20	12	4	3
0.29	8	5	15	8	5	2
Below	17	2	24	3	4	1
Median	.512		.465		.576	

Note.—Based on data from 419 colleges and 297,980 students.

[a]The correlations given are the correlations of a simple average of the best weighted combination of ACT scores and the best weighted combination of high school grades with overall college grade point average (GPA).

bination of grades and test scores with grades in each subject area were respectively: English—.44, .43, .52; mathematics—.43, .42, .51; social studies—.46, .46, .55; and natural sciences—.49, .47, .57 (The American College Testing Program, 1973). In addition, Table 9 gives correlations with several other specific college courses. From these data and the previous discussions it is clear that both the ACT test scores and student-

TABLE 9

Median Multiple Correlations of High School Grades and ACT Scores with Specific College Course Grades

College Course	No. Colleges	High School Grades	ACT Scores	HS Grades and ACT Scores
Biology	21	.59	.48	.60
Business	6	.21	.25	.39
Chemistry	20	.53	.49	.60
College Algebra	9	.47	.44	.55
English Composition	9	.44	.41	.51
Foreign Language	6	.45	.37	.50
History	30	.46	.37	.55
Political Science	6	.44	.46	.46
Psychology	17	.46	.46	.55
Sociology	6	.45	.58	.62

Note.—Data are from Table 5.16 (The American College Testing Program, 1973).

reported high school grades, individually and together, are predictive of college grades and are consequently valid for many uses for which estimates of college academic success are important. The relation of these predictors to other types of college success is examined in *Assessing Students on the Way to College: Technical Report for the ACT Assessment Program.*

The out-of-class accomplishment scales. For many uses, it is important that the ACT out-of-class accomplishment scales be valid predictors of similar college accomplishments. Richards, Holland, and Lutz (1967) correlated these scales with similar scales for college achievement for both the freshman and sophomore years. Their results, presented in Table 10, show that the ACT scales are substantially related to similar college accomplishments during both the first and second year of college. In addition, in each case the ACT scale was the best predictor of the corresponding college accomplishment from a predictor pool which included test scores and high school grades. Baird (1968) and Richards and Lutz (1968) reported similar findings of the value of the ACT scales as predictors of college accomplishments. They also found that either tests or high school grades provide relatively poorer prediction of such accomplishments.

TABLE 10

Relation of ACT Out-of-Class Accomplishment Scales and College Out-of-Class Accomplishments

Area of Accomplishment	Freshman Year		Sophomore Year	
	503 Men	592 Women	1,373 Men	1,419 Women
Art	.41	.49	.44	.51
Leadership	.29	.25	.28	.35
Music	.41	.35	.49	.39
Science	.31	.22	.40	.24
Speech	.34	.44	.33	.39
Writing	.43	.44	.45	.46

Note.–Data from Table 5.26 (The American College Testing Program, 1973), constructed from data of Richards, Holland, and Lutz (1967).

Fairness in Uses of Educational Assessment

The possibility that some uses of educational assessment might be unfair to particular groups, such as racial-ethnic minorities, has received much attention in recent years. Although the question of fairness is often raised in terms of the fairness of a test per se, the question more accurately should be directed toward the fairness of uses of a test. Tests are used in many ways, some of which may be fair and others unfair. Therefore, to evaluate fairness, one must examine the fairness of each use of a test. In this section the fairness of several common uses of the ACT Assessment is examined by answering three commonly raised questions.

What Do the Tests of the ACT Assessment Measure?

The debate about the fairness of tests in the popular literature has centered around the misconception that tests are direct, objective, scientific measures of capacity or innate potential for learning. Instead, tests are direct, objective, scientific measures of those activities a person can perform at a given point in time.

The four tests of the ACT Assessment, for example, are constructed as measures of developed academic abilities which a student displays when tested, abilities which have developed over many years and which have been

influenced by many factors including the student's educational experience and home environment. As a consequence, any use of the ACT tests (or any other test now in existence) which equates a test score with "natural potential" or "innate ability" is inappropriate and especially unfair to students whose educational or social background is different from the prevailing norm.

An analogy between test scores and household scales has been drawn to illustrate this very limitation on the meaning of test scores. Household scales give a person's weight. If that weight is low, the scales do not tell us whether the person has a natural innate tendency toward slimness or whether the person has not eaten adequately for several years. However, if the weight is unhealthily low, the person needs to be administered extra food and with proper treatment some weight gain can usually be achieved regardless of the cause for the low weight. Similarly, tests show what abilities a student can or cannot demonstrate today, but not the source of such abilities or inabilities. However, the demonstrated abilities and knowledges may have important implications for whether additional educational treatment is needed if some desired goal is to be achieved, regardless of the causes of any deficiencies.

In summary, tests measure what a student can do now and not the reasons for the performance. To use ACT test scores as measures of any kind of innate ability is inappropriate and unfair. The scores show only the present academic abilities which the student has acquired and, to be used fairly, must reflect only this meaning.

Do the ACT Tests Predict Fairly?

For some uses such as counseling, advising, and student planning, the most accurate possible prediction of future performance is needed. These are predictions of likely achievement if no intervening special action is taken. In these cases, it is important to ask if predictions of college performance based on the ACT tests are fair for various groups. If the predicted college grades for some groups of students are lower on the average than the grades those students eventually attain, prediction bias against those students is indicated. The possibility of this type of prediction bias has been frequently raised in the research literature and is examined in detail in Chapter VII of *Assessing Students on the Way to College: Technical Report for the ACT Assessment Program* for groups of different racial-ethnic background, sex, age, and socioeconomic status. The results of many studies of prediction bias are briefly summarized here.

Predictions for racial-ethnic minorities. Equations using ACT test scores to predict college grades are commonly based on a combination of racial-ethnic minority and majority students in one group. Research shows that such predictions are not biased against minority students but instead may, on the average, slightly overestimate their performance.

Predictions for men and women. Although racial-ethnic groups are commonly combined for prediction, separate prediction equations by sex are more common. Such separate equations are fair in prediction to both sexes. However, combined sex equations, when used, are generally biased against women by underpredicting their college grades on the average.

Predictions for groups of different socioeconomic status and age. Groups of different socioeconomic status are commonly combined for prediction purposes, and such predictions are accurate and fair for groups of both high and low socioeconomic status. Age groups are similarly combined for prediction; however, this procedure leads to consistent underprediction of the grades of older students, and thus to bias against them.

Summary. Current practices, as described above, result in no prediction bias against racial-ethnic minorities, men or women, or groups of different socioeconomic status. However, predictions obtained for older students should be adjusted upward to correct prediction bias against that group as should predictions for women in any colleges which use prediction equations based on both sexes combined.

How Should Tests Be Used in Selection?

Prediction idea of fairness in selection. It has frequently been assumed that the answer to the question "Do tests predict accurately?" also provides the answer to the question "Are tests fair when used for selection?" In making such an assumption, the judgment is made that selecting students with the highest predicted grades is fair because colleges are assured successful students and students selected are assured a high chance of success.

On the other hand, many observers who are concerned with the low rate at which minority students have been selected by colleges have suggested that prediction fairness and selection fairness are not the same. As a result, two additional general ideas of fairness have been proposed as alternatives to the prediction concept of fairness in selection.

Quota idea of fairness in selection. The first alternative definition of fairness in selection starts with a value judgment about a desirable outcome of selection such as proportionate representation of certain groups among those selected regardless of test scores, grade predictions, or other information. An example of this quota concept of fairness is the idea that to be fair to racial-ethnic minorities in selective admissions it is necessary to meet some quota of minority representation. Sex quotas express the same concept. A related idea involves making upward adjustments in predicted grades for some groups to implement a social value. In each case the process begins with a value judgment about the outcome of selection and a procedure which results in that outcome is considered fair.

ACT's conditional probability idea of fairness. A third idea of fairness in

selection has come from several years of ACT research. According to this idea, fairness primarily concerns certain guarantees to student applicants. It is suggested that students are not especially concerned that procedures assure that those selected have a high chance of success (as in the prediction idea) or that the result of selection matches some proportional representation (as in the quota idea). Rather, students who believe they can succeed, seem to want a fair chance at being selected in order to prove it. Under commonly used selection procedures, it often happens that minority students who could succeed if selected have, as a group, different chances of selection than their majority counterparts. Such discrepancy represents a kind of unfairness to the group of potentially successful students with lower chances of selection. To correct this type of selection unfairness, under this third idea of fairness, students who could succeed if selected are guaranteed an equal chance of being selected regardless of group membership. Because fairness is *conditioned* on those who can succeed and involves equal *probability* of selection, this idea of fairness is called the conditional probability concept of fairness.

The contrasts among the three types of fairness are made clearer by an examination of the fairness of current selection practices according to each idea of selection fairness. Extensive analyses of selection practices for groups of different racial-ethnic background, sex, age, and socioeconomic status reported in Chapter VII of *Assessing Students on the Way to College: Technical Report for the ACT Assessment Program* are summarized here.

Selection fairness for racial-ethnic minorities. First, commonly used selection procedures, while fair to racial-ethnic minorities according to the prediction idea of fairness, were usually unfair to these groups according to the quota and conditional probability ideas. To be fair according to the latter two ideas, more minority students should have been selected than were on the basis of grade predictions. Thus for colleges wishing to provide fair selection according to the conditional probability idea, for example, changes in common procedures will be required to provide equal opportunity for selection to all potentially successful students regardless of racial-ethnic background.

Selection fairness for men and women. The prediction idea of fairness in selection, which is commonly used and defended in discussions of racial-ethnic bias, is not commonly used in discussions of sex bias probably because research shows that such use would result in classes composed, on the average, of two-thirds women and one-third men. Probably as a consequence, sex quotas appear to be in wide use. However, if potentially successful men and women were assured equal opportunity of selection, a fairly even mix by sex would usually result.

Selection fairness for students of different ages and socioeconomic status. Present admissions procedures which fail to make some adjustment

for older students are unfair to these students according to all the ideas of fairness. However, present procedures appear to be fair (according to all the ideas of fairness) for students of both high and low socioeconomic status.

Summary. The results of these analyses indicate that whatever concept of fairness a college adopts, change in present procedures with regard to racial-ethnic minorities, men and women, or older students will be required if consistent values of fairness are to be applied to each case. At a minimum, these analyses may provide a clearer understanding of the values expressed in the procedures a college uses for selective admissions. At best the analyses may contribute to changes in admissions procedures to better reflect the values and goals of the college.

Perspectives for the Future

The research just described examines an important practical area of concern to test users, the fairness in the use of educational assessment. As a result of this research, ACT expects to provide routine analyses for individual colleges which will allow more convenient application of different ideas of fairness in selection as soon as the procedural mechanics can be implemented.

However, this research deals with only one aspect of a very broad and complex issue. The study of the values associated with and effects of test use in various groups leads naturally to more basic questions about the values associated with academic achievement in the American society and the factors affecting the development of such achievement in students belonging to various groups. These crucial educational questions provide the direction for future considerations of the complex issue of bias in American education.

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